LÄMPÖÄSSÄ
Ground Source Heat Pumps Since 1983

USER MANUAL
LÄMPÖÄSSÄ T 10 – 31 / P 10 – 31

LÄMPÖÄSSÄ 3/2010

LÄMPÖÄSSÄ
Suomalaisia maalämpöpumppuja vuodesta 1983

Content

1. GENERAL INFORMATION 5
1.1. Safety precautions 5
1.2. Transportation 5
1.3. Installation area 5
1.4. Removing the packaging 6
1.5. Structure and operating principles 6
1.5.1. Structure 6
1.5.2. Operation 6
2. INSTALLATION 7
2.1. Before installation 7
2.2. Pipe-laying 7
2.3. Connecting the collector pipe 8
2.4. Filling and de-aeration of the ground loop 8
2.5. Boiler connection 10
2.6. Heating connection 10
2.7. Domestic water connection and circulation of water 11
2.8. HEPAC check list 11
2.9. Electrical installation 11
2.9.1. Main switch 12
2.9.2. Sensors 12
2.9.3. Actuators 13
2.10. Electricity check list 13
2.11. Operating switches 13
2.12. Before startup 13
2.13. Startup 13
3. USER INFORMATION 15
3.1. Lämpöässä settings 15
3.2. Care and maintenance 15
3.3. Troubleshooting 15
4. TECHNICAL SPECIFICATIONS 17
4.1. Chart 17
4.2. Space requirements 17
5. WARRANTY 18
6. APPENDIX 19

1. GENERAL INFORMATION

We thank you for your confidence in our products and congratulate you on making an excellent choice! You have selected a long-lasting and environmentally friendly Lämpöässä geothermal heat system. We hope that you will enjoy Lämpöässä's heating system which will give you peace of mind for decades. It is important to read the user and maintenance instructions carefully. Please retain this manual for future use and reference should problems occur.

1.1. Safety precautions

To ensure the Lämpöässä geothermal heat system operates in a trouble-free manner and in order to obtain the best operating efficiency, the system must be transported and installed in accordance with the instructions provided by the manufacturer. After installation is complete, the check list provided must be reviewed in order to minimise any installation errors. The manufacturer shall not be responsible for any breakages of equipment which is not installed correctly or any costs incurred as a result of this.

The pipe and electrical installations for the Lämpöässä geothermal heating system can only be installed by qualified persons. If problems occur during installation, we recommend that you contact your retailer or our maintenance department. The telephone number for the maintenance department can be found in the documents delivered with the Lämpöässä heat pump. Electrical connections for the installation of the Lämpöässä may only be set up by qualified electricians.

In Lämpöässä T and P models – to prevent a compressor breakdown – the compressor and water in the storage tank must be preheated for 6 hours before the heat pump is started for the first time. Press the motor protective switch down and switch on the power. This stops the compressor starting and enables the electrical immersion to heat up the compressor and water in the storage tank. The compressor can be started after 6 hours of preheating.

The warranty of the Lämpöässä T compressor is not valid if preheating is not carried out.

1.2. Transportation

The Lämpöässä heat pump must always be transported in a vertical position. If tilting the system is unavoidable, for example to pass through a doorway, it may only be tilted to the left side or back as seen from the front of the heat pump. The unit may be moved from beneath using a forklift, for example. Do not go underneath the equipment while it is being lifted!

A transportation platform is fastened on both sides of the heat pump using screws. When the screws on the platform are removed, the adjustable feet used for final installation can be found inside.

1.3. Installation area

We recommend that the Lämpöässä geothermal heat pump be installed in a warm space which has a floor drain. During installation and when filling of the ground loop, some geothermal fluid mixture may be splashed on the floor. Glycol/water mixture can be used as well. The chosen area does not have to be fireproof. The floor must be able to withstand the weight of the heat pump and a full water tank. The floor must also be sufficiently even, because the heat pump must be as level as possible. Final adjustments can be made using the adjustable feet underneath the equipment.

1.4. Removing the packaging

Remove the plastic wrapping and corner padding from around the product. Check that the heat pump has not suffered any damage during transportation. If the heat pump is found to be damaged, the company which delivered the product must be immediately notified. Also check the contents of the delivery immediately.

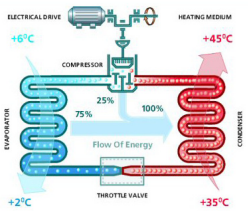
1.5. Structure and operating principles

1.5.1. Structure

The Lämpöässä geothermal heat system consists of a network of heat collection pipes, a geothermal fluid mixture circulating within the network and a geothermal heat pump unit. The geothermal heat pump unit consists of a compressor, evaporator, condenser and a refrigerant circulating inside the pump. The heat collection fluid in the ground loop and the refrigerant do not mix at any stage of the process.

1.5.2. Operation

The Lämpöässä heat pump transfers heat from the ground, water system or a bore well. Of the total thermal energy required for heating, Lämpöässä collects more than 70% from natural sources. Less than 30% of the electrical energy is required for the collection of thermal energy. This energy is used to run the various components in the system.



The heat collection pipe is a plastic pipe (PEM 40/10) with a water and ethyl alcohol or glycol-water mixture circulating inside. It is placed 1-1.2 metres deep in the ground or at least 3 metres deep in water. The bore well is normally 100-200 metres deep with a diameter of 140-165 mm. The heat pump is used in the transfer of heat from the water and ethyl alcohol mixture. Approximately three degrees of heat is transferred into the refrigerant circulating inside the heat pump, after which the geothermal fluid returns to the ground loop to heat up again.

Heat is transferred from one fluid to another in the evaporator, in which the refrigerant evaporates thanks to the low suction head of the compressor. This binds the heat from the geothermal fluid with the help of a disk thermal exchanger. The pressure of the gaseous refrigerant is increased using a compressor which makes the temperature of the refrigerant rise. The heat contained in the gas is transported in the condenser to heat the water in the water tank and thus produce hot water for use. As the heat is transferred, the gas turns into fluid once again and is carried back through a dehumidification filter and an expansion valve to circulate.

The Lämpöässä geothermal heat pump is suitable for producing hot water and heating single-family households, terraced houses, offices, hotels and industrial halls. Heat distribution can be implemented using floor heating with circulating water, water-filled radiators or the circulation of hot air. Floor heating has the best operating efficiency. In order to ensure trouble-free operation, all Lämpöässä heat pumps have been test-run, set up and tested by the manufacturer.

2. INSTALLATION

2.1. Before installation

Pipe assemblies for the installation of the Lämpöässä system may only be installed by qualified persons. The unit must be installed in accordance with the instructions provided and a check list must be reviewed after installation in order to minimise errors. The manufacturer shall not be responsible for any breakages of equipment which is not installed correctly or any costs incurred as a result of this.

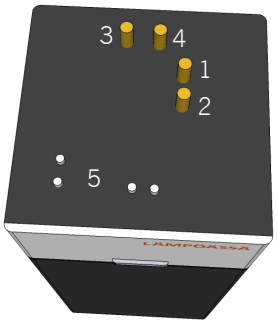
Check that

- all the required hoses and sensors are included in the delivery
- the heat pump has been correctly fitted
- the assemblies on top of the heat pump are intact
- the fuse size is correct for the main fuse and the heat pump (see technical specifications)
- collector pipes and the feed pipes have been installed correctly

2.2. Pipe-laying

Assemblies of the:

Lämpöässä T 10-15



1. To the boiler (Cu 28mm)
2. From the boiler (Cu 28mm)
3. From the superheater (Cu 28mm)
4. To the superheater (Cu 28mm)
5. Lead-through sensors / electric

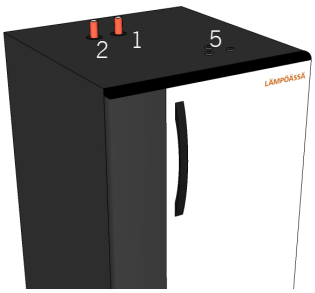
Lämpöässä P 10-15

Assemblies of the:

Lämpöässä T 21-31

1. To the boiler (Cu 28mm)
2. From the boiler (Cu 28mm)
3. To the superheater (Cu 28mm)
4. From the superheater (Cu 28mm)
5. Lead-through sensors / electric

Lämpöässä P 21-31



2.3. Connecting the collector pipe

Assemblies of the:
Lämpöässä T 10-15

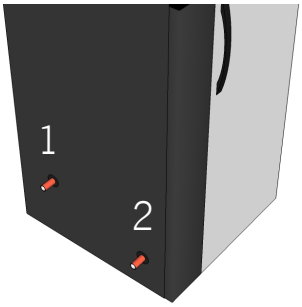
Collector pipe assemblies optionally on both sides. Connect asseblies to the collector pipe with care.

1. Collector pipe, flow (Cu 28mm)
2. Collector pipe, return (Cu 28mm)

Unused assemblies must be plugged.

Lämpöässä P 10-15

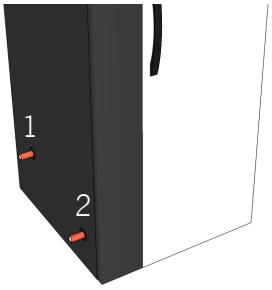
Assemblies of the:
Lämpöässä T 21-31



Collector pipe assemblies on the side. Connect asseblies to the collector pipe with care.

1. Collector pipe, flow (1¼" uk)
2. Collector pipe, return (1¼" uk)

Lämpöässä T 21-31

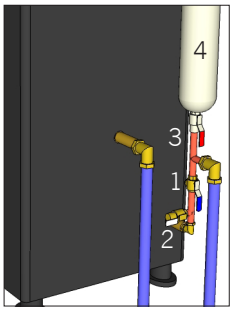


2.4. Filling and de-aeration of the ground loop

Equipment required for the filling and deaeration of the ground loop:

- container, 60 litres
- a submersible pump fitted with a filter, lifting height approximately 30 m
- water and ethyl alcohol, or glycol-water mixture (1:1) with a frost resistance of -17 degrees Celsius
- 2 x textile hose 1-2"
- couplings adaptable to filling unit

THE FILLING AND DE-AERATION PROCESS OF T 10-15 / P 10-15

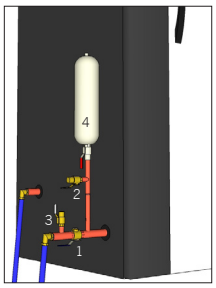


Please check that the ground loop has been correctly connected (see “Connecting the ground loop” section) and that the compressor has been preheated (see ”Safety precautions” section).

1. Install filling and de-aeration assemblies to the collector pipe (return) according to the picture beside
2. Attach textile hoses to filling unit
    - Attach a textile hose from submercible pump to the filling unit (between brine pump and shut-off valve).
    - Attach the textile hose from filling unit (between shut-off valve and collector pipe) to mixing tank.
3. Fill the container with a geothermal fluid mixture (ethyl alcohol water 1:1 or glycol)
4. Open filling unit valves (nr 2 and 3) and close the shutt-off valve (nr 1)
5. Turn on the submercible pump.
6. Add water and ethyl alcohol mixture to the mixing tank until no more fluid can enter the pipes.
7. Use the brine pump of the ground source heat pump to accelerate the circulation.
    - Turn the main switch (Q1) and the heating switch (S2) on.
    - Turn the switch S4 (Auto - 0 - Maalämpö) to the position 0 (compressor running prevented).
    - Check that motor protection switces (QM1, QM2) are on.
    - Turn the control current (F3) on. The brine pump starts. Check the rotation direct of the brine pump by using the switch S2.

    Keep the submercible pump running until the fluid is clear and no gurgling can be heard from the pipes. Please note! Deaeration usually takes several hours and helps ensure that all the air is removed from the system and that there are no malfunctions once the system is started.LEAVE NO PRESSURE IN THE NETWORK!
8. Turn pumps off.
9. Close filling unit valves (nr 2 and 3)
10. Remove textile hoses.
11. Clean the ball valve with integral filter of both collector loops.
12. Open the valve nr 1.
13. Install the expansion tank (nr 4) to the de-aeration assembly (nr 3)
14. Fill the expansion tank with ethyl alcohol m ixture (2/3 capacity)
15. Install the safety valve to the top of the expansion tank
16. Open the de-aeration assembly (nr 3)

THE FILLING AND DE-AERATION PROCESS OF T 21-31 / P 21-31



Please check that the ground loop has been correctly connected (see “Connecting the ground loop” section) and that the compressor has been preheated (see ”Safety precautions” section).

1. Install filling and de-aeration assemblies to the collector pipe (return) according to the picture beside
2. Attach textile hoses to filling unit
    - Attach a textile hose from submercible pump to the filling unit (nr 2)
    - Attach the textile hose from filling unit (nr 3) to the mixing tank.
3. Fill the container with a geothermal fluid mixture (ethyl alcohol water 1:1 or glycol)
4. Open filling unit valves (nr 2 and 3) and close the shutt-off valve (nr 1)
5. Turn on the submercible pump.
6. Add water and ethyl alcohol mixture to the mixing tank until no more fluid can enter the pipes.
7. Use the brine pump of the ground source heat pump to accelerate the circulation.
    - Turn the main switch (Q1) and the heating switch (S2) on.
    - Turn the switch S4 (Auto - 0 - Maalämpö) to the position 0 (compressor running prevented).
    - Check that motor protection switces (QM1, QM2) are on.
    - Turn the control current (F3) on. The brine pump starts. Check the rotation direct of the brine pump by using the switch S2.

Keep the submercible pump running until the fluid is clear and no gurgling can be heard from the pipes. Please note! Deaeration usually takes several hours and helps ensure that all the air is removed from the system and that there are no malfunctions once the system is started. LEAVE NO PRESSURE IN THE NETWORK!

8. Turn pumps off.
9. Close filling unit valves (nr 2 and 3)
10. Remove textile hoses.
11. Clean the ball valve with integral filter of both collector loops.
12. Open the valve nr 1.
13. Fill the expansion tank with ethyl alcohol m ixture (2/3 capacity)
14. Install the safety valve to the top of the expansion tank.

Filling and deaeration have now been completed. Install the expansion tank, if the collector pipe is planned to be pressurized. PLEASE NOTE! Once the heat collecting pipes have been placed in a bore well, we would advise users to switch the positions of the textile hoses in the group of fill valves during filling and deaeration. This increases the efficiency of the pipes.

2.5. Boiler connection

Connect the boiler to the ground source heat pump accordingly the HWAC drawings (chapter 6). The connection may vary depend on the boiler type.

2.6. Heating connection

The heating circuit 1 is the main circuit with higher temperature e.g. heating with radiators. The heating circuit 2 is

the secondary circuit with lower temperature e.g underfloor heating.

Pipes in the heating network are connected to the ground source heat pump using either textile hoses (network of radiators) or using a fixed piping network (floor heating network). These connections stop sound from passing into the pipes. All heating connections (for example, a heating radiator for an air conditioner or a heated towel rail) must be made to the heat piping. When the network piping on the is in place, filling may commence. The pipes in the network are filled with water.

Please note! If renovating, ensure that the heat distribution piping has been properly rinsed before connecting the heat pump.

Filling a heating system fitted with a pressure gauge:

- open the fill valve on the heating network
- fill the piping with water
- deaerate the piping through the water tank
- fill and deaerate the network until all the air has been removed and leave the pressure at 1–1.2 bar
- maximum values
    - heating network 1,5 bar
    - DHW network 9 bar

2.7. Domestic water connection and circulation of water

Complete the piping connections according to the piping connections diagram in section 2.2. The circulation water pump is installed on the input side of the heat pump. The mixing valve is fitted to the hot water pipe in order to prevent burns.

The overflow pipe is joined to the floor drain as instructed or to an overflow funnel if the distance to the floor drain is more than two metres. The overflow funnel must be directed down towards the floor drain. The backpressure valve is fitted to the cold water joint on the input side.

2.8. HEPAC check list

Check that

- the connections are tight and there are no leaking valves
- the expansion tank on the heating system and fill side is properly installed
- the overflow pipe on the shut-off valve and the pressure gauge on the heating system have been properly installed
- the heating system has been filled and deaerated appropriately
- collector pipes has been installed, filled and deaerated appropriately

2.9. Electrical installation

Only qualified electricians are permitted to carry out electrical work on the heat pump according to general regulations.

Device		T 10 / P 10	T 13 / P 13	T 15 / P 15	T 21 / P 21	T 31 / P 31
Electrical connection		400V 3N~	400V 3N~	400V 3N~	400V 3N~	400V 3N~
Fuse size (slow)	A	3 x 16 C	3 x 16 C	3 x 16 C	3 x 25 C	3 x 25 C

The Lämpöässä heat pump is connected to a 400 V (50 Hz). The Lämpöässä heat pump has been fitted with an integrated electrical switchboard to which is permanently powered. A plastic-coated wire is used as a supply line. This wire travels to the master switch in a casing pipe.

2.9.1. Main switch

The main switch must install before other installations.

2.9.2. Sensors

The master switch must be installed before any other installation takes place. In order for the outdoor sensor to recognise weather conditions as effectively as possible, it is very important that it be placed in the correct location. The outdoor sensor should be placed on the north-western or northern side of the building to avoid the effects of the morning sun. If the sensor cannot be placed as recommended, ensure that it is protected from direct sun light.

The sensor is placed approximately 2/3 of the way up the wall of the building near the corner. A sensor should not be placed under a roof, in a place protected from the wind or over a vent, doors or windows where the temperature is not the normal outdoor temperature. In order for the room sensor to detect average indoor temperatures as reliably as possible, it must be placed in a central and open location, for example a hallway between several rooms or the staircase. String a bipolar electrical line (at least 0.5 mm²) from the heat pump to the room sensor. Position the room sensor approximately 2/3 of the way up the wall. Connect the room sensor lead to the heat pump. Please note! Leads must be correctly connected in order for the heat pump to operate.

In order to obtain the best results, the room sensor and leads can be tested in diffirent locations before being permanently installed.

Ouman 201	Connection strip	Cable type
Outdoor sensor	1	2 X 0,75 mm2
Room sensor (equipment)	3	2 X 0,75 mm2
Flow sensor	2	2 X 0,75 mm2
Hot gas sensor	11	2 X 0,75 mm2
Sensor, lower part	10	2 X 0,75 mm2
Sensor, upper part	9	2 X 0,75 mm2
Ouman 203	**Connection strip**	**Cable type**
Outdoor sensor	1	2 X 0,75 mm2
Flow sensor HC1	2	2 X 0,75 mm2
Room sensor HC1 (equipment)	3	2 X 0,75 mm2
Flow sensor HC2	5	2 X 0,75 mm2
Flow sensor DHW	7	2 X 0,75 mm2
Sensor, upper part	9	2 X 0,75 mm2
Sensor, lower part	10	2 X 0,75 mm2
Hot gas sensor	11	2 X 0,75 mm2

Room sensor TMR (equipment): connection from sensor to room space.

2.9.3. Actuators

Ouman 201	Connection strip	Cable type
Mixing valve motor	51, 52, 53	3 X 1,5 mm²
Ouman 203	**Connection strip**	**Cable type**
Heating Circuit 1 Mixing valve motor	51, 52, 53	3 X 1,5 mm²
Heating Circuit 2 Mixing valve motor	55, 56, 57	3 X 1,5 mm²
DHW Mixing valve motor	59,60,61	3 X 1,5 mm²

2.10. Electricity check list

Check that

- all phases going to the switchboard are in the correct phase sequence
- tension difference between phases is 400V
- the main fuse size is correct
- the fuse size of ground source heat pump is correct (slow)
- as needed, the current control is installed in to the electric control panel

2.11. Operating switches

- Q1 - Main switch
- F3 - Control current
- S1 - Heating on/off
- S2 - Heat distribution pump 1
- S5 - Heat distribution pump 2
- S3 - AUTO - 0 - MAALÄMPÖ
- S4 - Condenser pump and magnetic valve
- QM1 - Compressor
- QM2 - Brine pump

2.12. Before startup

Before startup, check that:

- the heating system has been connected, filled and deaerated appropriately
- the ground loop has been installed, filled and deaerated appropriately
- electrical connections have been made appropriately
- all sensors has been installed
- fuses are in position: *on*

2.13. Startup

- Turn on the main switch.
- Press down black motor protection switches QM1 and QM2.
- Turn the switch S1 on.
- Turn the AUTO - 0 - MAALÄMPÖ switch to the position MAALÄMPÖ.
- Start the ground source heat pump with the switch F3.
- Check the rotation direction of brine pumps. Check the phase rule in case of the incorrect rotation direction.

The Lämpöässä ground source heat pump starts. If the installation is carried out carefully and in accordance with the instructions provided the system will work faultlessly from the very beginning.

Possible problems during startup

Problem	Cause	Solution
Fuses always blow when the compressor is being started.	You are using the wrong type of fuse.	Check that the fuse is automatic: C or D/ ceramic fuse: SLOW or with a snail icon.
	Temporary connections at the site are causing an overload on the fuses.	Reduce load.
The ground loop pump does not start.	The regulator may not be getting any power.	Check the regulator fuse.
	The regulator is not authorised to start the pump.	Check the measured/set values.
The ground loop pump does not circulate fluid.	The brine pump is rotating in the wrong direction.	Switch the location of the two phases.
	Shut-off valves are in the fill position.	Check that the deaeration and fill valves are in the 'closed' position and that the intermediate valve is open.
The compressor runs for a little while and the steam pressure switch goes off.	There may still be air in the ground loop.	Deaerate the ground loop.
	There may be a leak in the refrigerant loop.	Contact the manufacturer.
The fluid level in the ground loop fill container drops suddenly after startup.	There is a leak in the system (the smell of ethyl alcohol is strong), there is a leak in the ground loop or there is still air in the ground loop.	Check the condition of valves in the deaeration group on the air lock and the shaft seal on the ground loop pump and, if possible, the ground loop extension joints, or deaerate.
Thermal relays go off when starting.	The compressor or the ground loop pump is short-circuited or one of the phases is not activated.	Check electrical connections.
	Fuses in the master switchboard of the building are faulty.	Check and replace fuses as required.

3. USER INFORMATION

3.1. Lämpöässä settings

Information in this section has been compiled from the Lämpöässä 201GT/203GT Manual, which, in addition to the following, includes more detailed information on the various functions and detailed reading(s).

3.2. Care and maintenance

The Lämpöässä heat pump is an easy-care heating system. It requires no regular maintenance and its simple structure makes Lämpöässä reliable to use. If the installation is carried out carefully and in accordance with the instructions provided, there is usually no need for maintenance. The fill container inside the geothermal heat pump should be checked every couple of weeks during the first few months and afterwards approximately once a month for the first year of use thereafter.

3.3. Troubleshooting

If an alarm sounds, we always recommend that you first check that the regulator does not have the 5-minute compressor running prevention enabled. The facility can be overridden by turning the master switch to 0 and back.

The geothermal heat pump is controlled according to two measured values: the measured value at the bottom and at the top of the water tank. A minimum value is determined for each set value in the “Set values” section.

In practice, consumption of hot water also starts the compressor. The lower the minimum set value for the lower part of the water tank, the more economical the use of the system. However, it is important to note when determining the set value that values which are too low will reduce the amount of hot water available.

Problem	Possible cause	Solution
The compressor does not start	The water tank temperature is adequate and in accordance with the regulator.	No action required.
	The compressor has been stopped for less than 5 minutes.	No action required.
	Fuse problem.	Check the condition of the fuses in the master switchboard.
The compressor does not start and the regulator display reads: “divergence alarm reading 4 compressor operation”.	The protection switch for the motor has gone off. OR The suction pressure switch on the pressure switch has gone off.	Press the protection switch for the motor. OR Set off the switch.
No text is visible on the regulator.	The device is not getting any power.	Check that the control current and master switch are on.
	A fuse has blown.	Replace the fuse.
	The display is broken/the circuit board of the regulator is faulty.	Contact maintenance.

Thermal relays go off immediately when power is switched on.	The protection switch for the motor goes off if the equipment is short-circuited or one of the phases is not on.	Contact an electrician.
	Fuses in the master switchboard of the building are faulty.	Check the condition of the fuses and replace as required.
Regulator display reads: Enter code	You have attempted to change the settings in maintenance mode.	Special settings for maintenance mode are not required for normal use. Set values for temperatures can be set in normal mode.
The system does not produce enough heat	A sudden drop in outdoor temperature may temporarily cause inadequate heating power in new buildings, because moisture contained in the structure takes up a lot of heat when it dries.	No action required.
	During the first year, the ground loop may not produce heat at full power because the earth around the ground loop pipes has not yet become more solid.	No action required.
The set value and measured value for the regulator do not match.	A maximum limit has been used for the set values.	
	A spiking over-voltage caused by a lightning strike has caused a fault in the condenser, causing the temperature to drop from the actual values.	The regulator must be replaced (not under warranty).
	The regulator motor has been set on manual and the regulation does not take place.	
	In the summer, the temperature in the room where the heat pump is located may rise to up to 30 degrees Celsius. In these cases, the temperature sensor for the output water is reading the air temperature instead of the temperature for the output water.	No action required.
The compressor is on all the time or for long periods of time.	A lot of heat is needed, for example the outdoor temperature is very low or the structure is drying during the first year's use of the building.	No action required.
	Lack of refrigerant. Can be detected from bubbles in the liquid container even after some minutes of use.	Contact a refrigeration supplier or maintenance.
	The processor/software on the regulator is faulty.	Turn off the control current switch for 10 seconds and turn it back on. If turning off the power does not help, contact maintenance.

If the above instructions do not help, please contact your local Lämpöässä dealer.

PLEASE NOTE! The warranty shall be subject to the existence of an appropriately completed and issued warranty certificate and a certificate signed by the user stating that the mechanic instructed the user on how to operate the equipment.

4. TECHNICAL SPECIFICATIONS

4.1. Chart

Lämpöässä		T 10 / P 10	T 13 / P 13	T 15 / P 15	T 21 / P 21	T 31 / P 31
Dimensions width depth height	 mm mm mm	 590 640 1400	 590 640 1400	 590 640 1400	 780 780 1300	 780 780 1300
Weight	kg	180	200	220	280	318
Electrical connection		400V 3N~	400V 3N~	400V 3N~	400V 3N~	400V 3N~
Supplied output 35/50°C *	kW	11,4/10,6	14,2/13,1	16,7/15,3	20,6/18,9	31,2/28,9
Supplied input 35/50°C *	kW	2,4/3,3	3,0/4,0	3,6/4,6	4,8/5,9	7,9/10,2
Start current	A	37	45	52	88	159
Fuse size (slow)	A	3 x 16 C (Slow)	3 x 16 C (Slow)	3 x 16 C (Slow)	3 x 25 C (Slow)	3 x 25 C (Slow)
Supply cable size *	mm^2	5 x 2,5 s	5 x 2,5 s	5 x 2,5 s	5 x 16 s	5 x 16 s
Compressor		Scroll	Scroll	Scroll	Scroll	Scroll
Refrigerant	g	1400	1750	1750	2820	2900
Max length of ground loop	m	300	500	2x300-400	2x400-500	3x400 / 4x400
Current control		Accessory	Accessory	Accessory	Accessory	Accessory

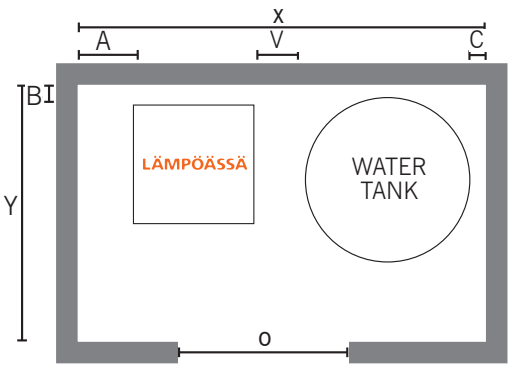
* Ground collector 0°C

4.2. Space requirements

The heat pump requires 50mm more floor space to the side of assemblies than its external dimensions. Lämpöässä T10-T31 and P10-31 geothermal heat pumps are 1.3-1.4 metres in height. Approximately 0.4 metres of space must be reserved for the assemblies on top of the heat pump. This should be taken into account when placing the heat pump in a low room, such as a basement.

The Lämpöässä geothermal heat pump should be installed in a warm, insulated space which has a floor drain, because some ground loop fluid may be splashed on the floor when the ground loop is filled. The chosen area does not need to be fireproof.

mm	T10 / P10	T13 / P13	T15 / P15	T21 / P21	T31 / P31
A	600	600	600	600	600
B	50	50	50	150	150
C	50	50	50	50	50
O	800	800	800	1100	1500
X	3500	3500	3500	3500	3500
Y	1500	1500	1500	1750	1750
V	400	400	400	400	400



5. WARRANTY

Suomen Lämpöpumpputekniikka Oy offers a two- (2) year warranty with the Lämpöässä T geothermal heat pumps it manufactures. The manufacturer shall not be responsible for any breakages of equipment which is not installed correctly, any brekages of equipment which is installed contrary to the instructions provided, or any costs incurred as a result of these actions.

The warranty shall be subject to the existence of an appropriately completed and issued warranty certificate and a certificate signed by the user stating that the mechanic instructed the user on how to operate the equipment.

NOTICE! THE WARRANTY OF THE LÄMPÖÄSSÄ T COMPRESSOR IS NOT VALID IF PREHEATING IS NOT CARRIED OUT.

6. APPENDIX

Connection diagram, device T10-31/201 GT

Connection diagram, device T10-31/203 GT

Connection diagram, device P10-31/201 GT

Connection diagram, device P10-31/203 GT

Main circuit T/P 10-15

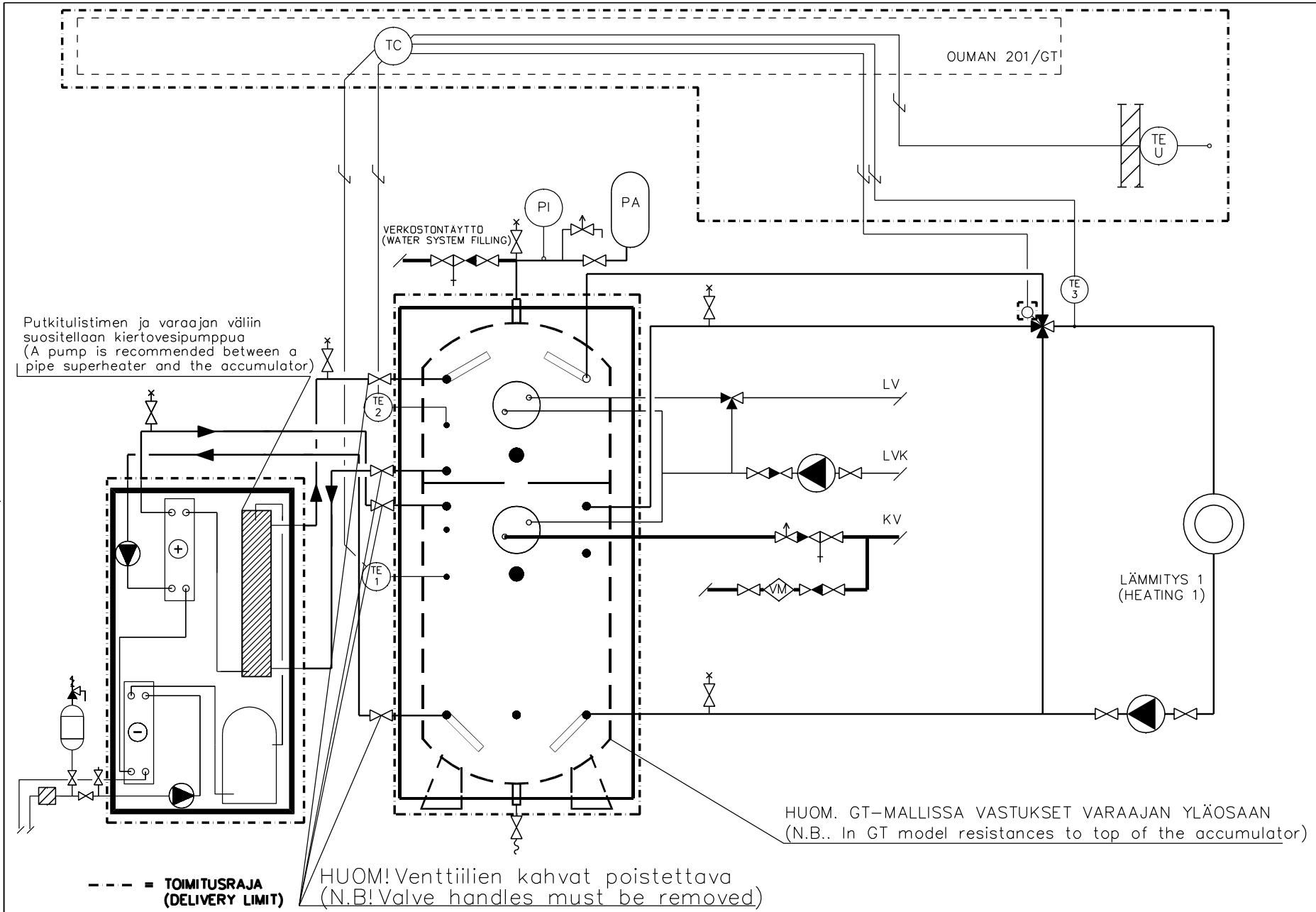
Control circuit / condensor pump, heat distribution pumps T/P 10-15

Control circuit / compressor. brine pump, immersion T/P 10-15

Main circuit T/P 21-31

Control circuit / condensor pump, heat distribution pumps T/P 21-31

Control circuit / compressor. brine pump, immersion T/P 21-31

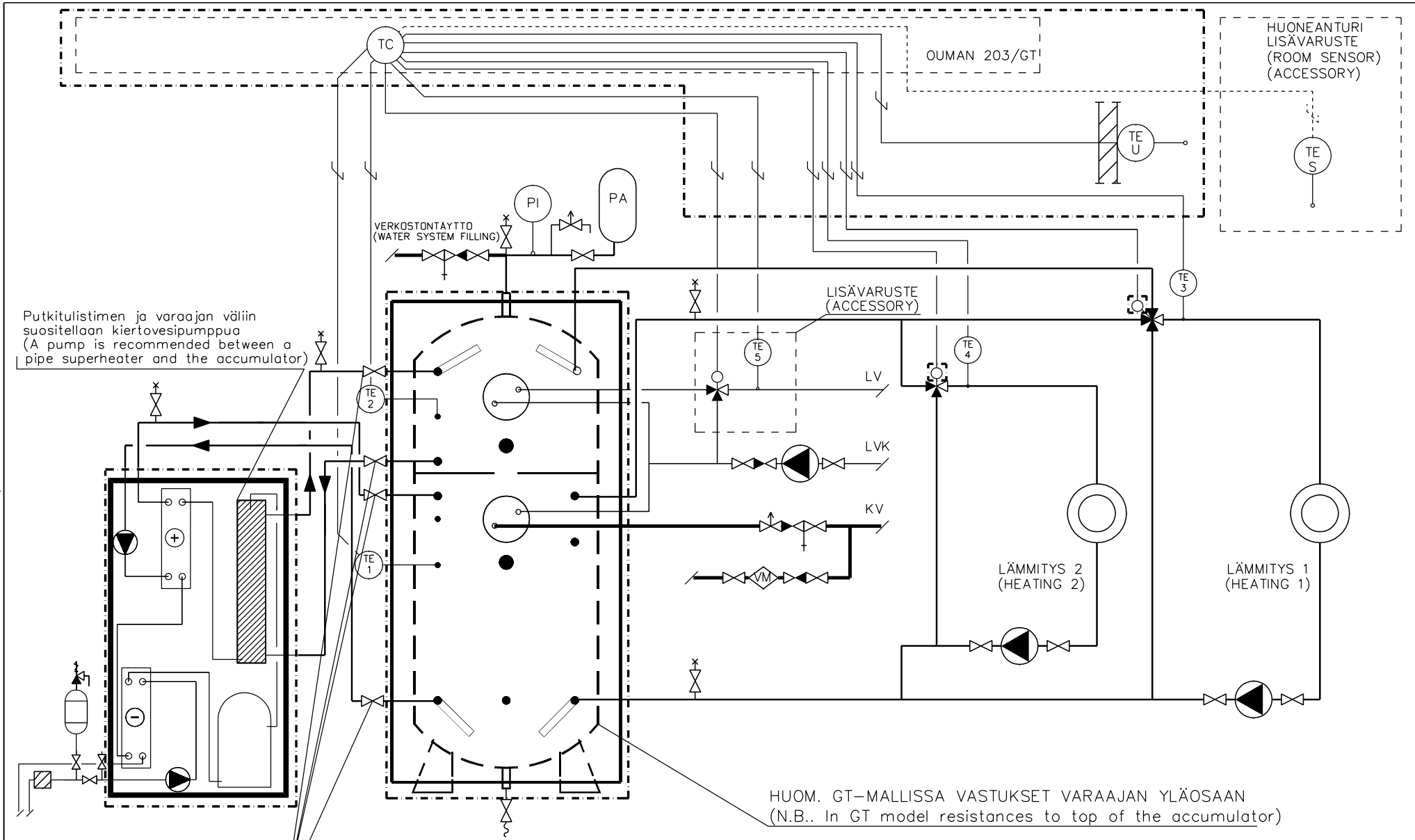


– – – = TOIMITUSRAJA
(DELIVERY LIMIT)

HUOM! PUMPUN JA VARAAJAN VÄLISET KYTKENNÄT EIVÄT KUULU TOIMITUKSEEN.
(N.B! CONNECTION BETWEEN WITH PUMP AND BOILER NOT ICNLUDE IN DELIVERY)

LÄMPÖÄSSÄ	SUUNN. JVi / PIIRT. / PVM. 23.11.2009 / ALLEKIRJOITUS	HVAC SCHEMATIC/1–CIRCUIT CONNECTION CONTROL LÄMPÖÄSSÄ 201/GT LÄMPÖÄSSÄ T10–T31	LVI KYTKENTÄKAAVIO/1–PIIRIKYTKENTÄ OHJAUS LÄMPÖÄSSÄ 201/GT LÄMPÖÄSSÄ T10–T31	SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O / MUUTOS L_T1031_201GT_10A LEHTI / LEHDISTÄ / TILAAJAN N:O

PÄIVÄYS | NIM. | LUKUM. MUUTOS | TUNN.

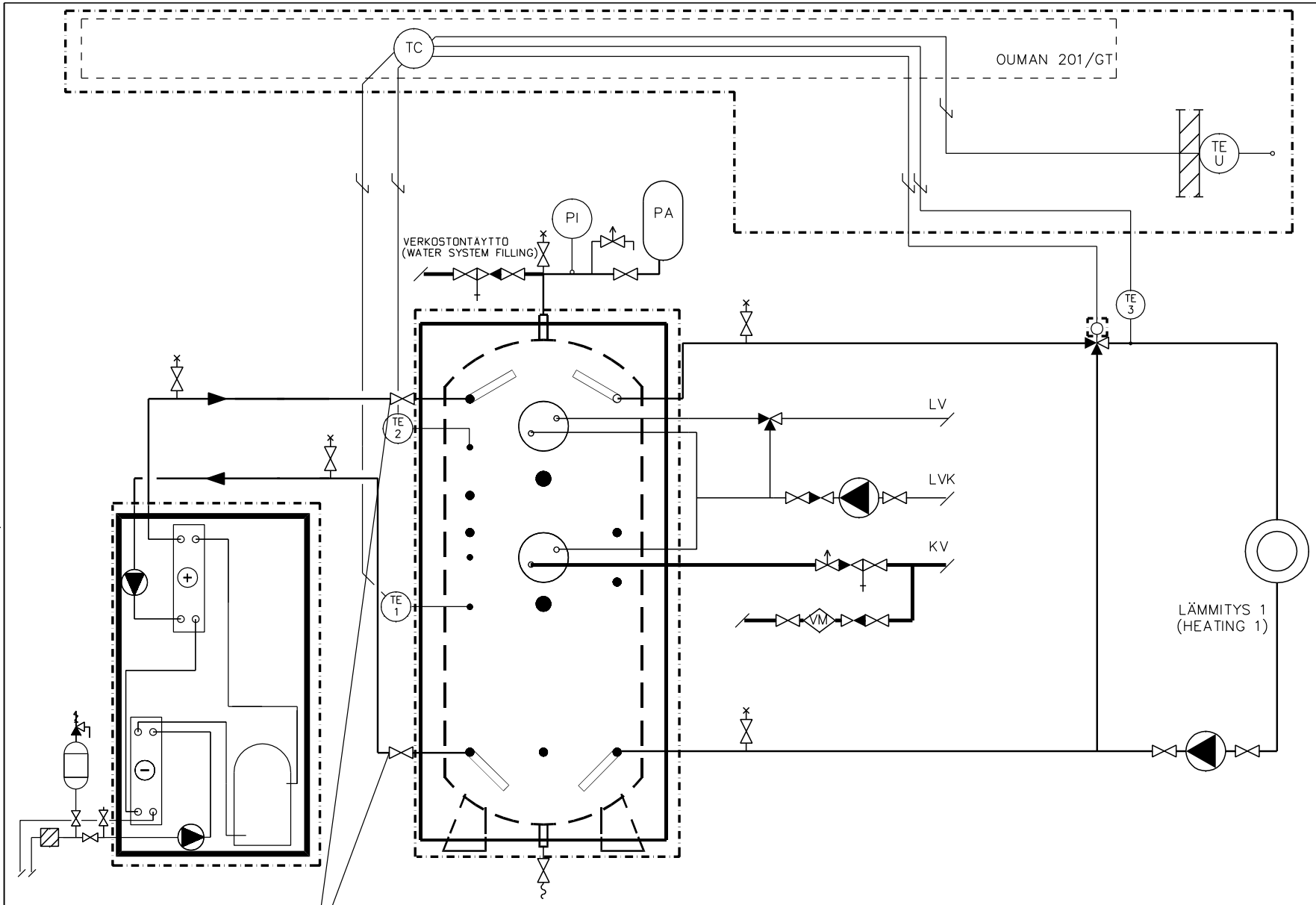


– · – · – = TOIMITUSRAJA
(DELIVERY LIMIT)

HUOM! PUMPUN JA VARAAJAN VÄLISET KYTKENNÄT EIVÄT KUULU TOIMITUKSEEN.
(N.B! CONNECTION BETWEEN WITH PUMP AND BOILER NOT ICNLUDE IN DELIVERY)

LÄMPÖÄSSÄ	SUUNN. JVi / PIIRT. / PVM. 23.11.2009 / ALLEKIRJOITUS	HVAC SCHEMATIC/2–CIRCUIT CONNECTION CONTROL LÄMPÖÄSSÄ 203/GT LÄMPÖÄSSÄ T10–T31	LVI KYTKENTÄKAAVIO/2–PIIRIKYTKENTÄ OHJAUS LÄMPÖÄSSÄ 203/GT LÄMPÖÄSSÄ T10–T31	SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O L_T1031_203GT_10A / MUUTOS	LEHTI / LEHDISTÄ / TILAAJAN N:O

PÄIVÄYS | NIM. | LUKUM. MUUTOS | TUNN.



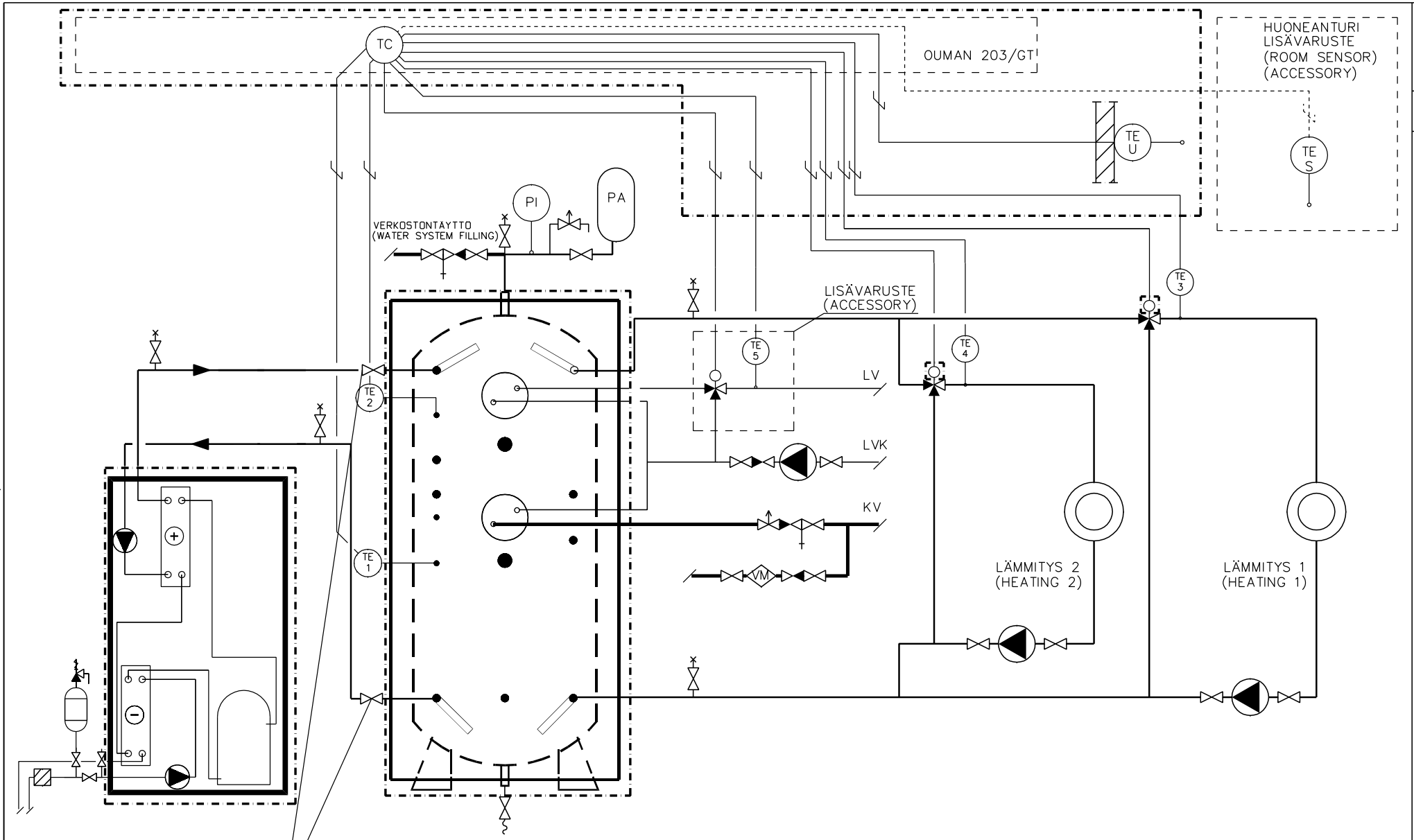
- - - = TOIMITUSRAJA
(DELIVERY LIMIT)

HUOM! Venttiilien kahvat poistettava
(N.B! Valve handles must be removed)

HUOM! PUMPUN JA VARAAJAN VÄLISET KYTKENNÄT EIVÄT KUULU TOIMITUKSEEN.
(N.B! CONNECTION BETWEEN WITH PUMP AND BOILER NOT ICNLUDE IN DELIVERY)

LÄMPÖÄSSÄ	SUUNN. JVi / PIIRT. / PVM. 23.11.2009 / ALLEKIRJOITUS	HVAC SCHEMATIC/1-CIRCUIT CONNECTION CONTROL LÄMPÖÄSSÄ 201/GT LÄMPÖÄSSÄ P10-P31	LVI KYTKENTÄKAAVIO/1-PIIRIKYTKENTÄ OHJAUS LÄMPÖÄSSÄ 201/GT LÄMPÖÄSSÄ P10-P31	SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O / MUUTOS L_P1031_201GT_10A LEHTI / LEHDISTÄ / TILAAJAN N:O

PÄIVÄYS | NIM. | LUKUM. MUUTOS | TUNN.



= TOIMITUSRAJA
(DELIVERY LIMIT)

HUOM! Venttiilien kahvat poistettava
(N.B! Valve handles must be removed)

HUOM! PUMPUN JA VARAAJAN VÄLISET KYTKENNÄT EIVÄT KUULU TOIMITUKSEEN.
(N.B! CONNECTION BETWEEN WITH PUMP AND BOILER NOT ICNLUDE IN DELIVERY)

LÄMPÖÄSSÄ

SUUNN.	PIIRT.
JVi	
PVM.	
23.11.2009	
ALLEKIRJOITUS	

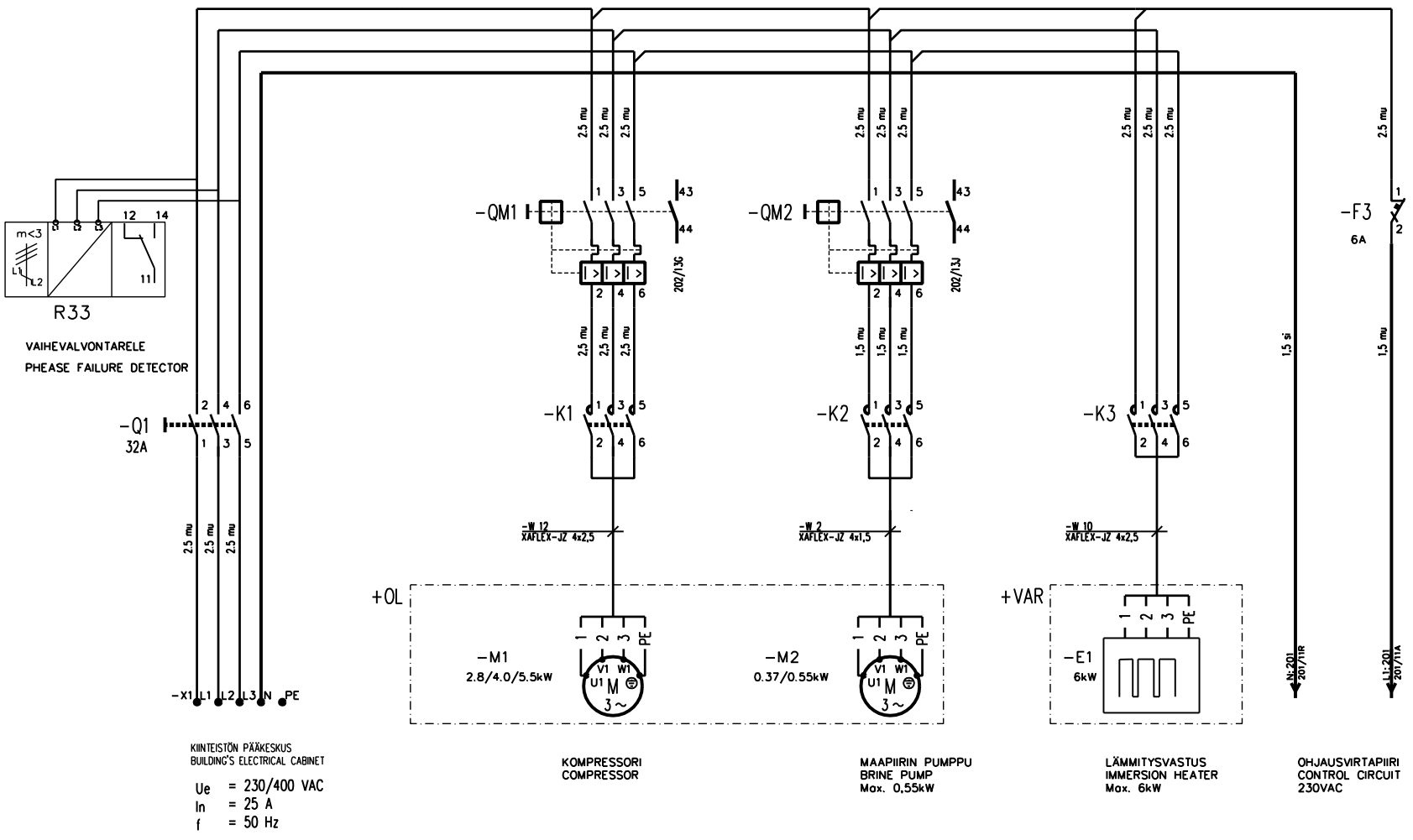
HVAC SCHEMATIC/2-CIRCUIT CONNECTION
CONTROL LÄMPÖÄSSÄ 203/GT
LÄMPÖÄSSÄ P10-P31

LVI KYTKENTÄKAAVIO/2-PIIRIKYTKENTÄ
OHJAUS LÄMPÖÄSSÄ 203/GT
LÄMPÖÄSSÄ P10-P31

SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O MUUTOS
L_P1031_203GT_10A

LEHTI	LEHDISTÄ	TILAAJAN N:O

PÄIVÄYS
NIM.
MUUTOS
LUKUM.
TUNN.



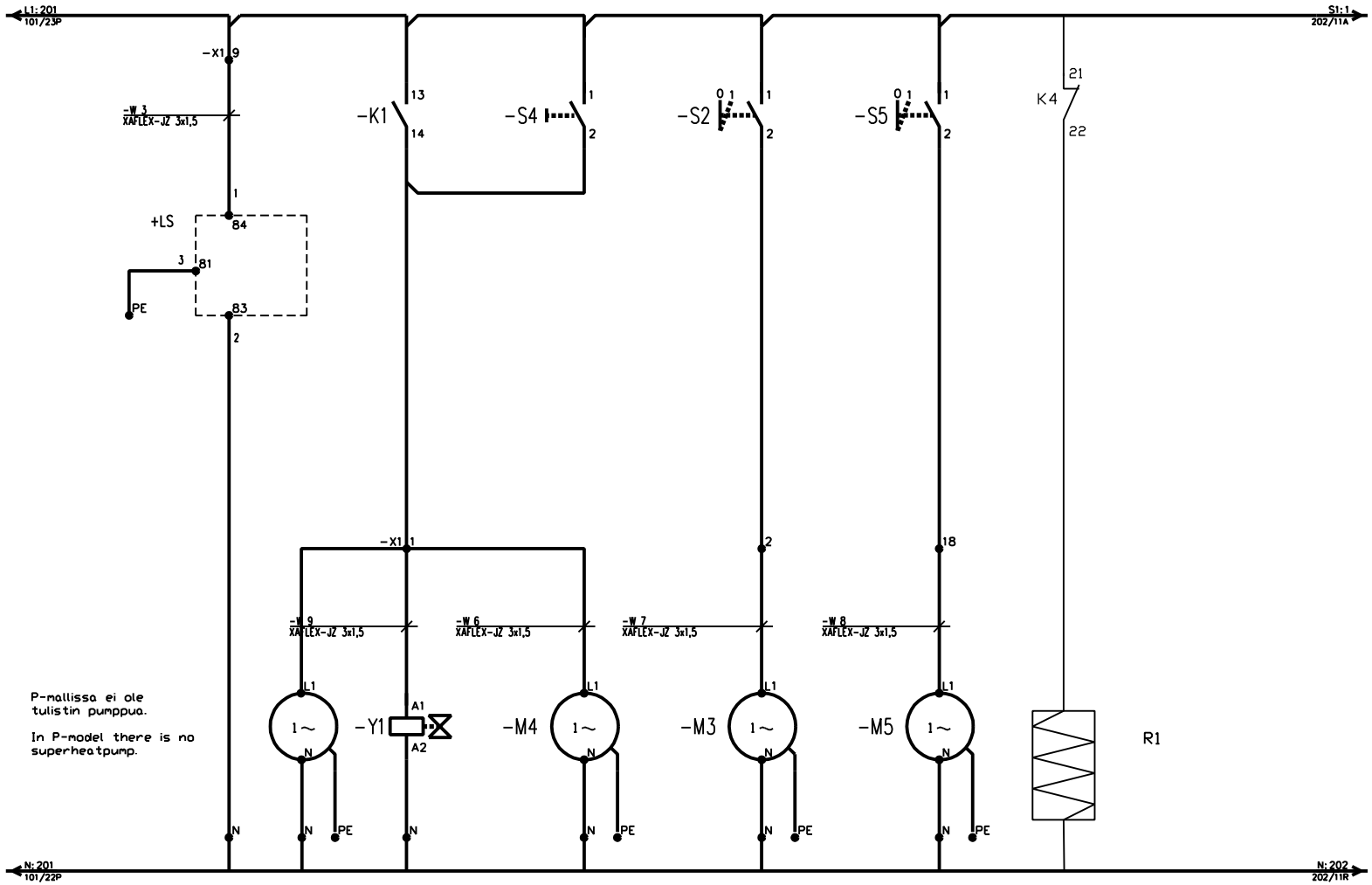
LÄMPÖÄSSÄ

MAIN CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ T_P&S 10-15/08

PÄÄVIRTAKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ T_P&S 10-15/08

Suunn. SMa /	Piiritunnus	Keskus	Työnro
Piirt. 2.1.2009	Lehti 1 / 3	Piirustus n:o	
Tark.		S&T_P10-15 K3 09C	

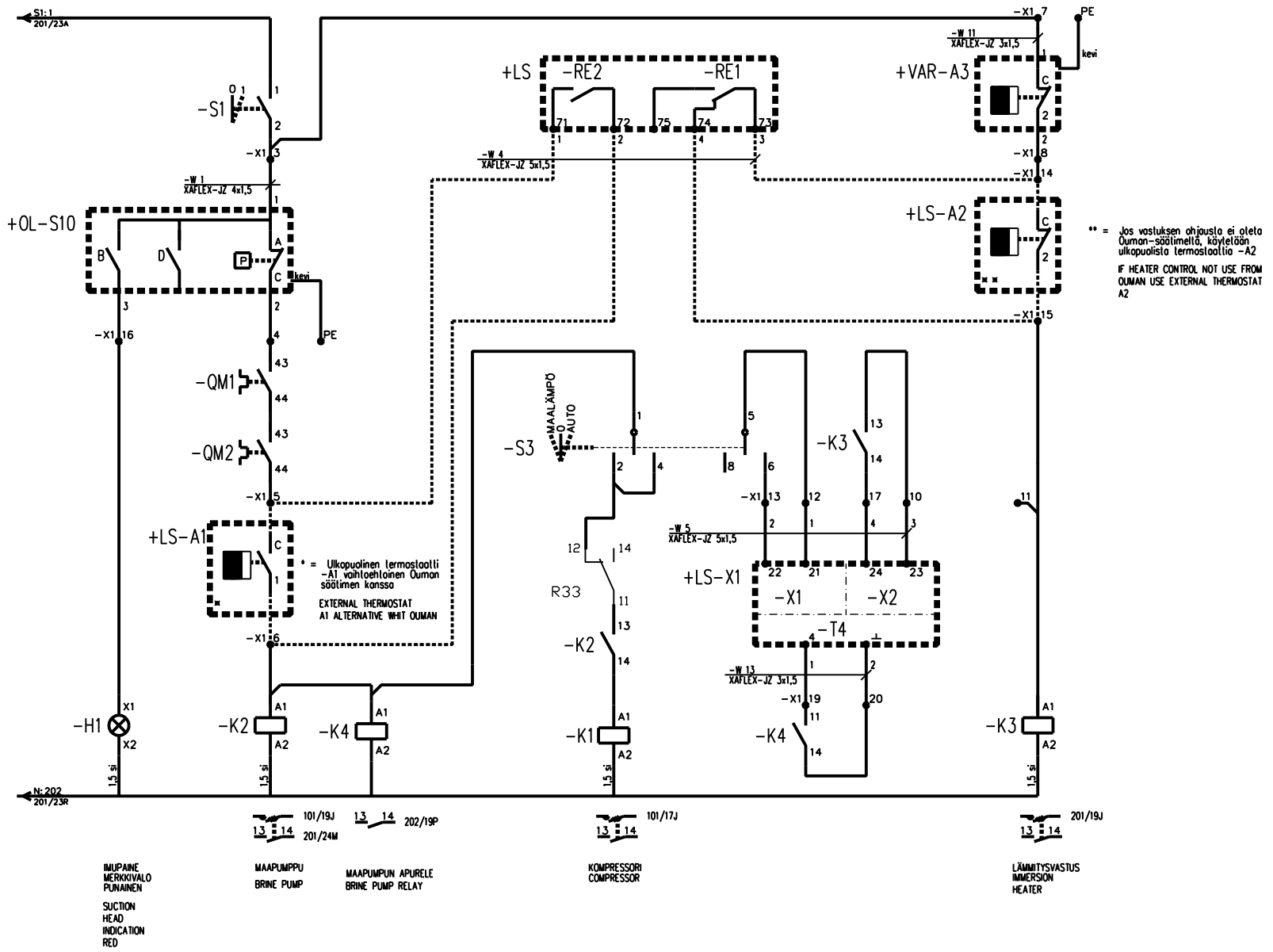
A muutos B muutos C muutos
D muutos E muutos F muutos



LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND SOURCE HEAT PUMP LÄMPÖÄSSÄ T_P&S 10-15/09	PIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ T_P&S 10-15/09	Suunn. SMa /	Piiritunnus	Keskus / Työnro
			Piirt. 2.1.2009	Lehti 2 / 3	Piirustus n:o S&T_P10-15 K3 09C
			Tark.		

A muutos B muutos C muutos

D muutos E muutos F muutos



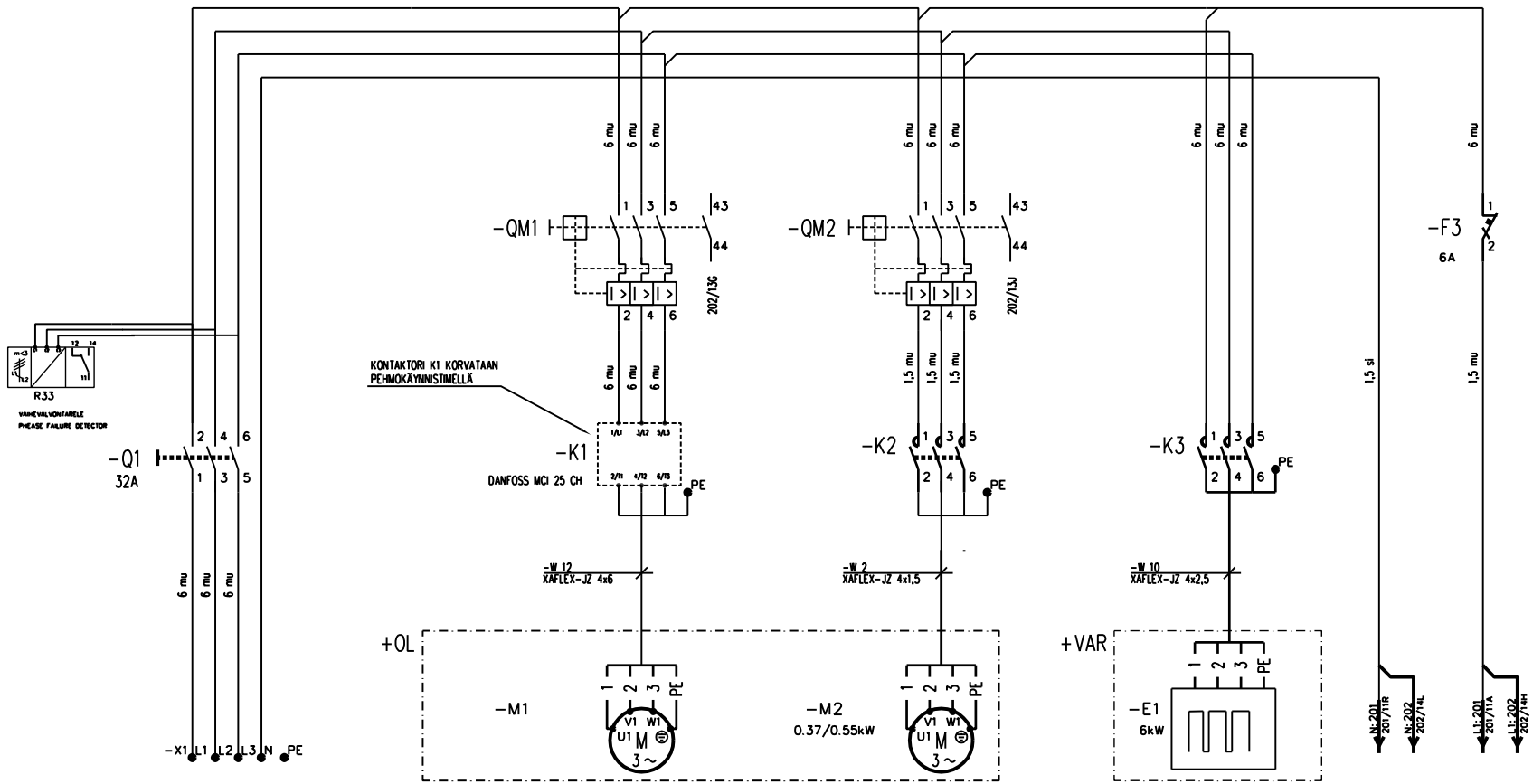
LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ T_P&S 10-15/09

PIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ T_P&S 10-15/09

Suunn. SMa /	Piiritunnus	Keskus	Työnro
Piirt. 2.1.2009	Lehti 3 / 3	Piirustus n:o	
Tark.		S&T P10-15 K3 09C	

A muutos
B muutos
C muutos
D muutos
E muutos
F muutos



SYÖTTÖ
SUPPLY
Ue = 230/400 VAC
In = T18=25 A , T20-31=32A
f = 50 Hz

KOMPRESSORI
COMPRESSOR
T18 ZH56 16A
T20 ZH75 21A
T31 ZH92 25A

MAAPUMPPU
BRINE PUMP
Max. moottorikoko 0,55 kW
Max. motor size 0,55 kW

LÄMMITYSVASTUS
HEATING ELEMENT
Max. power 6kW
Max. vastus 6kW

OHJAUSVIRTAPIIRI
CONTROL CIRCUIT
230 VAC

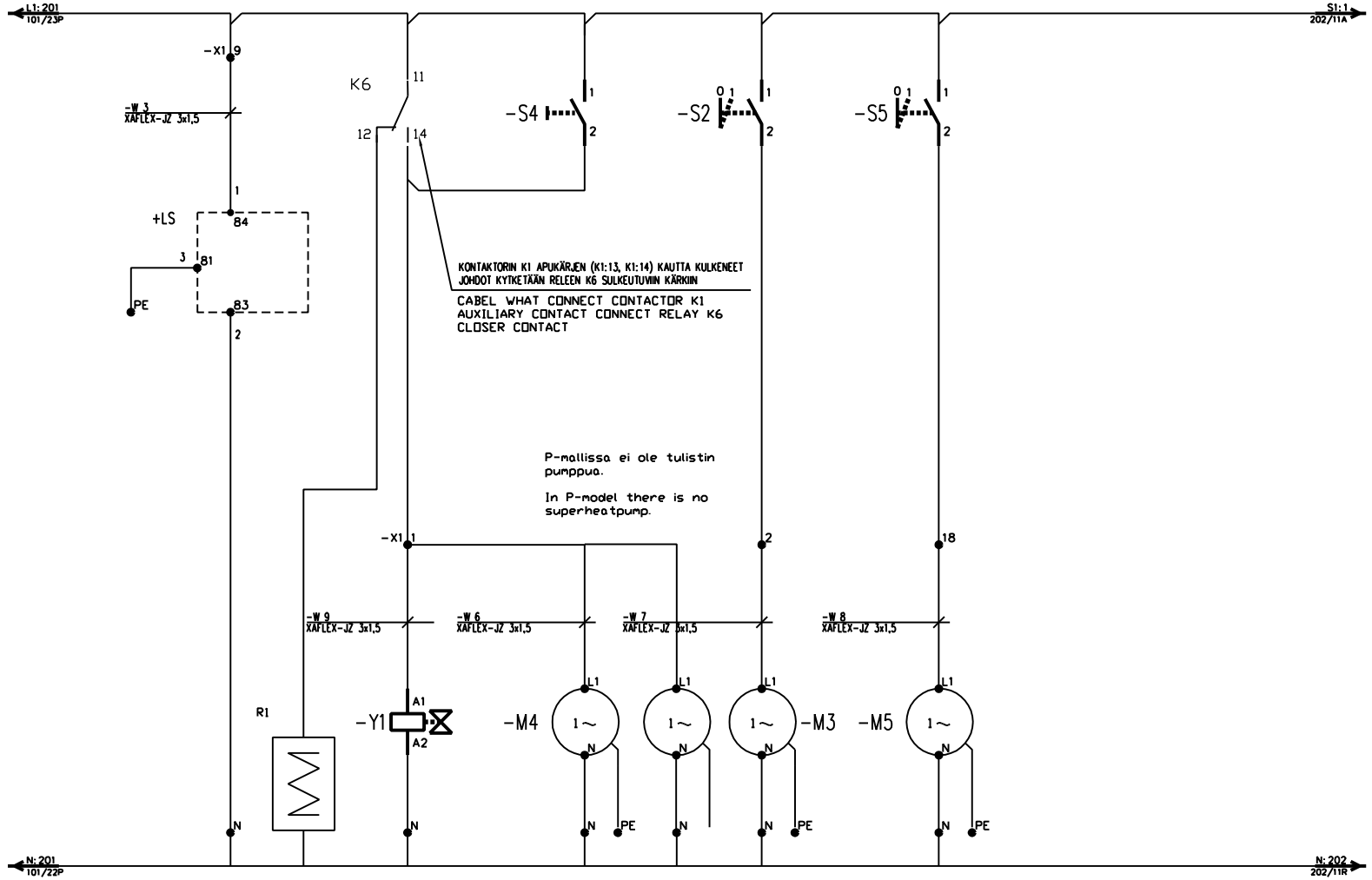
LÄMPÖÄSSÄ	MAIN CIRCUIT GROUD HEAT PUMP LÄMPÖÄSSÄ T_P21-T_P31 SOFT START	PÄÄVIRTAKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ T_P21-T_P31	Suunn. SMa /2.1.2009 Piirt. Tark.	Piiritunnus	Keskustunnus / Työnumero
				Lehti 1/3	Piirustusnumero ST2131P309C

24.11.2009

D muutos
E muutos
F muutos

A muutos
B muutos
C muutos

S_T P&S2131 P3_09C_sivu1



RYHMÄKESKUS VIRRANSYÖTTÖ
POWER

KAMPIKAMMION VASTUS
CRANK CASE HEATER

MAGNEETTI-VENTTIILI
MANGNETIC VALVE

LAUHDUTIN-PUMPPU
CONDENSER PUMP

TULISTIN PUMPPU
SUPERHEAT PUMP

LJ-PUMPPU 1
HEAT DISTRIBUTION PUMP 1

LJ-PUMPPU 2
HEAT DISTRIBUTION PUMP 2

LÄMPÖÄSSÄ

CONTROL CIRCUIT/CONDENSER PUMP,HEAT DISTRIBUTION PUMP BRINE PUMP
LÄMPÖÄSSÄ 21,31 SOFTSTARTER

OHJAUSVIRTAPIIRI/LAUHDUTINPUMPPU,LJ-PUMPUT MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ T_P21-T_P31 PEHMOKÄYNNISTIN

Suunn.	Piiritunnus	Keskustunnus	Työnumero
SMa 12.1.2009			
Piirt.	Lehti 2/3	Piirustusnumero	
Tark.		ST2131P309C	

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

24.11.2009

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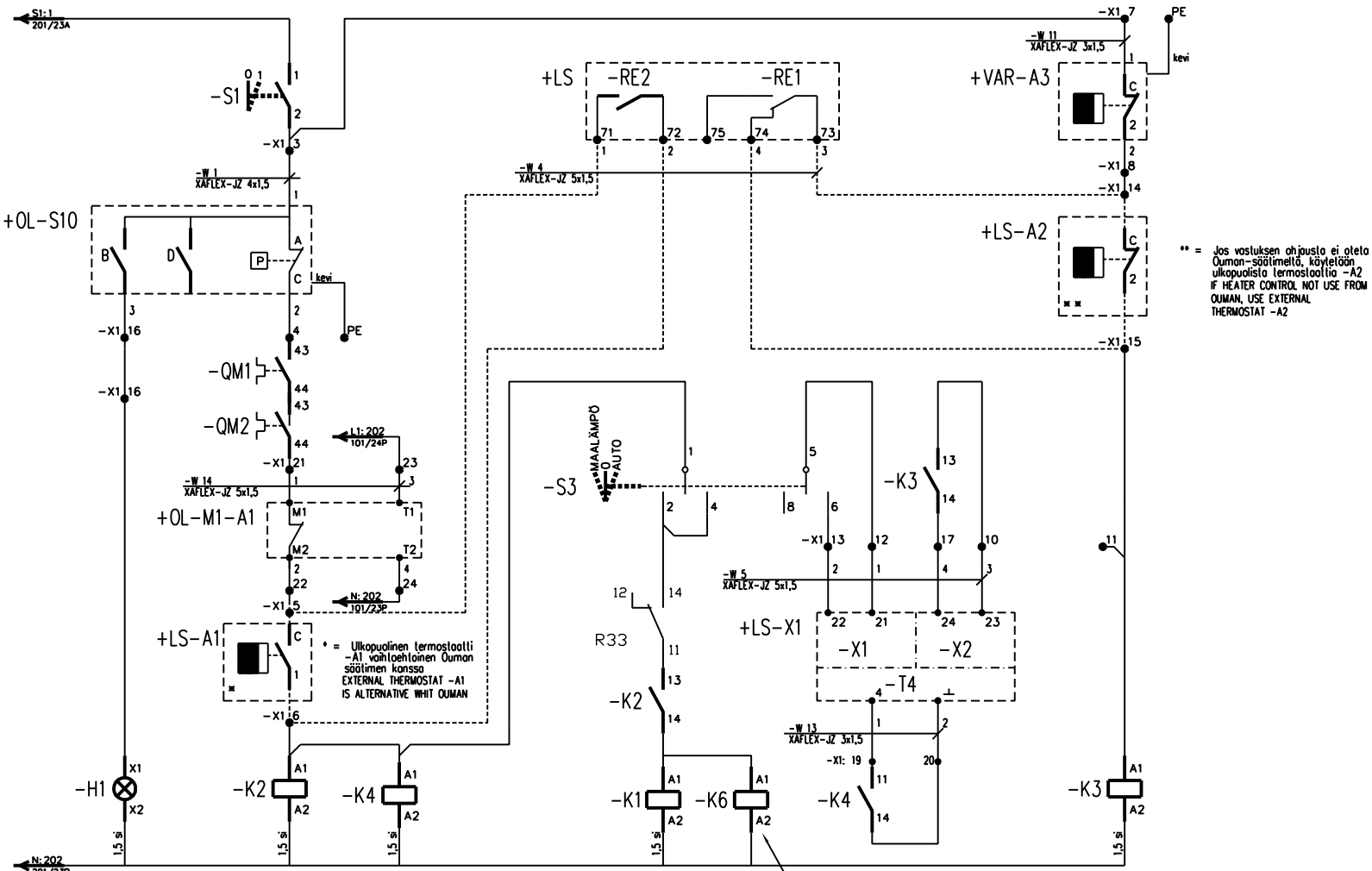

LÄMPÖÄSSÄ

CONTROL CIRCUIT/COMPRESSOR,BRINE PUMP,HEATER
GROUNDHEAT PUMP
LÄMPÖÄSSÄ 21,31

OHJAUSVIRTAPIIRI/ KOMPRESSORI,MAAPUMPPU,VASTUS
MÄÄLÄMPÖPUMPPU
LÄMPÖÄSSÄ T_P21-T_P31

Suunn. SMa /2.1.2009	Piiritunnus	Keskustunnus	Työnumero
Piirt.	Lehti 3 / 3	Piirustusnumero	
Tark.		ST2131P309C	

A muutos B muutos C muutos D muutos E muutos F muutos

24.11.2009

S_T P&S2131_P3_09C_sivu3

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